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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/700,025	11/03/2003	Rak-Hyun Song	KORE10000500	3409

22891 7590 03/02/2007
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EXAMINER

WALKER, KEITH D

ART UNIT	PAPER NUMBER
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1745

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/02/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/700,025

Applicant(s)

SONG ET AL.

Examiner

Keith Walker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Claims 2-9 are pending examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 2-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 2, the sequential coating of LSM, LSM & YSZ, and LSCF layers makes a cathode layer. The specification does not enable one skilled in the art to make to make this cathode since the specification describes assembling the layers in the following order: LSM & YSZ, LSM and LSCF.

2. Claims 2-9 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 2, the cathode layer comprises three layers with different materials of different percentages. Each of the three layers comprises the ceramic material and 50

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– 75 %wt organic solvent and 5 – 40 %wt. additive. The second layer comprises 10 – 30 % LSM and 20 – 50 % YSZ. The percent weight of each component is being interpreted as based on the total weight since the claim doesn't say to the contrary. Using the minimum amounts of three of the four components making up the second layer, the specification does not enable one skilled in the art to make the second layer with a YSZ component of 46 – 50% since this would give more than 100 %wt total.

Claims depending from claims rejected under 35 USC 112, first paragraph are also rejected for the same.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fabrication and Characteristics of Anode-Supported Flat-Tube solid Oxide Fuel Cell (Kim) in view of US Publication 2005/0037252 (Pham), US Patent 5,516,597 (Singh) and US Patent 4,913,982 (Kotchick).

Kim teaches a method of making an anode supported fuel cell. The anode is made by extruding Nickel oxide – yttrium stabilized zirconia (YSZ) powder and pre-sintering the paste at 1300 °C to form a tube. The electrolyte layer is dip coated on the

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anode and the two layers are co-sintered at 1400°C. An interconnector layer of LaCaCrO (LCC) is plasma sprayed onto the anode supported fuel cell to form a ceramic connector. Coating three different layers onto the electrolyte layer forms the cathode. The three layers are LaSrMnO (LSM), LSM & YSZ and LaSrCoFeO (LSCF). The amount of YSZ in the second layer is 40% wt. (Abstract, 1, 2.1, 2.2, 3.1). A metal interconnector coated with LSM and sintered at partial pressure is used to connect the multiple fuel cells together (3.2).

Kim is silent to the particular amounts of organic solvents and other additives.

Kotchick teaches adding plasticizers and binders in an amount of approximately 10 - 40% to the ceramic materials to make a slurry. Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without a showing that the claimed range achieves unexpected results relative to the prior art (MPEP 2144.05). It is well known in the art at the time of the invention to add additives such as solvents, binders, plasticizers, homogenizing agents and dispersing agents to the slurry to perform each of the intended purposes. Each of these additives serves a particular purpose to make using the slurry to form the final solid oxide components easier. The porosity of the electrode materials is important to the operation of the fuel cell (6:15-30, 7:35-45). This porosity will contribute to the amount of binder and pore forming agent added to the slurry. Since both the materials are burned out during the sintering process, the more added to the slurry the more porous the final electrode component, for the same total weight of product. The process used to form the tubular

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fuel cells (i.e. dip-coating) will also regulate the amount of each of these additives. If multiple thin coats are wanted versus one thick coat, the slurry will be made thinner. It is held that claimed ranges of a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result, which is different in kind and not merely in degree from the results of the prior art (MPEP 2144.05).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the amount of each of the elements used in Kim to optimize the slurry mixture to produce an electrode with the correct porosity and viscosity.

Kim is silent to the use of masking for making the interconnect layers.

Singh teaches masking the electrode area where the interconnect layer will later be placed (10:1-15). Masking off an area that is not suppose to be coated with the applied material is well known in the art.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the assembly process of Kim with the making method of Singh to keep an applied material from being attached to an under layer by masking the area an then removing the masking to reveal an area without the deposited material.

Kim is silent to the grooves, gas channels and protrusions on the LSM coated interconnectors.

Pham teaches interconnects having grooves cut and protrusions made to facilitate the passage of gas reactants around the fuel cell (Figs. 6-9, 12; [0045-0049]). The grooves provide more surface area for the gas reactants to reach and the protrusions aid in the current collecting of the fuel cell.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the interconnector of Kim with the grooved interconnector of Pham to improve the electrical conductivity and gas passage around the fuel cell.

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

K. Walker


JOSEPH RYAN
SUPERVISOR/PATENT EXAMINER